

## REMARKS

Claim 1 has been amended to substitute the broader term "comprising" for the narrower term "provided with." Paragraph breaks have also been added to claim 1. Applicants respectfully submit that these paragraph breaks do not affect the scope of the claim.

New claims 15 and 16 have been added, in means plus function form.

Figure 1 has been amended to eliminate a duplicate reference numeral. The specification has been amended to reflect the change in the drawing.

### Art rejections

The art rejections are respectfully traversed.

Applicants respectfully submit that the art rejection fails to comply with the requirements of 37 CFR 1.104. The Examiner asserts that the Zavislan reference shows various features, but fails to indicate where in Zavislan these features are shown. Given the length of the reference, Applicants respectfully submit that this is improper.

Similarly, when the Examiner refers to the Asah reference, most of the elements allegedly founded Asah are not pointed to with specific column and line numbers.

Applicants accordingly respectfully submit that the Examiner has failed to present a *prima facie* case of obviousness.

Moreover, the Examiner has not indicated which arguments presented in the rejection correspond with which claims. Applicants will assume therefore that the rejections apply only to claim 1.

The Examiner having apparently failed to indicate where any of the dependent claims may be allegedly taught or suggested in the references, Applicants assume that the dependent

claims would be allowable if rewritten in independent form. If this is not the case, the Examiner is respectfully requested to clarify where the limitations of the dependent claims may be found in the references.

#### Claim 1

Assuming that the rejection does apply only to claim one, Applicants respectfully submit that in addition to the lack of a *prima facie* case, the references have been mischaracterized.

Claim 1 recites an image sensor. The image sensor produces an image of a portion of the skin. A control unit determines the target position of the laser beam as a function of a position and/or orientation on the skin of a hair to be removed as determined from the image by the control unit.

The Examiner admits that the Zavislan reference fails to show automation or electronic control of hair removal. In an attempt to correct this deficiency, the Examiner cites the Asah reference. Applicants respectfully submit that the Examiner mischaracterizes the reference.

Asah does not teach or suggest the use of an image sensor which produces an image of a portion of the skin. Instead, Asah discloses the use of the detector which successively detects the values of predetermined tissue parameters in a number of successive positions on the skin. It is entirely unclear how this detector could be combined with the image technology of Zavislan.

Asah also does not teach or suggest the determination of the position and/or the orientation of a hair on the skin as claimed by Applicants. Instead, Asah determines the position of hair follicles by comparing — in the consecutive positions — the detected value of the tissue parameter within a value characteristic for the presence of a hair follicle.

Accordingly, Asah does not teach or suggest that the target position of the laser beam is determined from position and/or orientation of a hair on the skin. Instead, the target position is determined as being the position of the hair follicles which is detected as described before.

Thus Asah fails to correct the deficiencies of Zavislan.

#### New Claims

New claim 15 is analogous to claim 1 in many of its limitations, though it is in means plus function format.

New claim 16 recites that the function derives a position of hair root based on the position and/or orientation of the hair. This further distinguishes patentably over Asah which appears only to detect a hair follicle position, not to derive a root position from a hair position.

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Applicants respectfully submit that they have answered each issue raised by the Examiner and that the application is accordingly in condition for allowance. Allowance is therefore respectfully requested.

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Respectfully submitted,

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February 4, 2002

## MARKED UP VERSION OF SPECIFICATION

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In the embodiment shown in Fig. 4, the fourth processor 59 determines the output signals  $u_{M1}$  and  $u_{M2}$  in accordance with a predetermined mathematical relation between the output signals  $u_{M1}$ ,  $u_{M2}$  and the desired target position 9 of the laser beam 7 as determined by the third processor 57. Said mathematical relation is, for example, a linear function or a function of a higher degree comprising a number of coefficients. As a result of temperature fluctuations or other factors, deviations of the target position 9 resulting from a predetermined value of the output signals  $u_{M1}$ ,  $u_{M2}$  may arise. Such deviations can lead to a reduced efficiency of the hair-removing device 1 and to skin irritations or damages. To reduce or avoid such deviations and provide a very accurate positioning of the laser beam 7 on the skin 11 by the mirrors 19, 21, the control unit 17 further comprises a calibration member 81 for calibrating said predetermined mathematical relation on the basis of a measured relation between the output signals  $u_{M1}$ ,  $u_{M2}$  and an actual position of the laser beam 7 on the skin 11. Said calibration, for example, constitutes a re-calculation of said coefficients of the predetermined mathematical relation on the basis of the measured relation between the output signals  $u_{M1}$ ,  $u_{M2}$  and the actual position of the laser beam 7 on the skin 11, and is carried out by the control unit 17, for example, each time the hair-removing device 1 is started or each time after a predetermined time interval. To carry out said calibration, the mirrors 19, 21 are consecutively positioned in a predetermined number of calibration positions. For this purpose, the fourth processor 59 consecutively supplies a predetermined number of output signals  $u_{M1}$ ,  $u_{M2}$  having predetermined values. In each calibration position of the mirrors 19, 21, the actual position of the laser beam 7 on the skin 11 is

determined by means of a seventh processor 83 of the control unit 17, which determines said actual position from the image detected by the image sensor 47. For this purpose, as shown in Fig. 4, the seventh processor 83 [recieves] receives the signal  $u_s$  supplied by the image sensor 47, and supplies a signal  $u_{AP}$  corresponding to the actual position of the laser beam 7 on the skin 11 to the calibration member 81. After the determination of the actual position of the laser beam 7 in each calibration position of the mirrors 19, 21, the calibration member 81 supplies a signal  $u_{CAL}$  corresponding to the re-calculated coefficients of the predetermined mathematical relation to the fourth processor 59. During said calibration process, the fourth processor 59 activates the laser source 3 at a comparatively low energy density via a suitable value of the signal  $u_L$ . Said energy density is as low as possible, but such that the spot of the laser beam 7 on the skin 11 is still sufficiently bright to be detected by the image sensor 47. In this manner, skin irritation or damage are prevented during the calibration process, and the energy consumption of the laser source 3 is limited. It is noted, that the invention also comprises embodiments, in which the actual position of the laser beam 7 on the skin 11 is determined in a similar manner from the image detected by the image sensor 47, but in which the laser beam manipulator 5 is corrected in a different manner. The control unit 17 may, for example, alternatively be provided with a feed back control circuit comprising a comparator, which compares the actual position of the laser beam with the desired target position and supplies an error signal, and a PID regulator, which determines the output signals  $u_{M1}$  and  $u_{M2}$  on the basis of said error signal in such a manner that the measured actual position equals the desired target position. The invention also comprises embodiments, in which the actual position of the laser beam on the skin is not determined by means of the image sensor, but by means of a separate sensor means such as, for example, sensors which directly measure the angular positions of the mirrors 19, 21.

As Fig. 1 shows, the hair-removing device 1 according to the invention further comprises a handle [81] 181 by means of which the user can place the hair-removing device 1 on the skin 11 to be treated and can displace it over the skin 11. As was described above, the portion of the skin 11 present below the opening 33 only is treated. After the treatment of said portion of the skin 11, the user should displace the hair-removing device 1 into a next position on the skin 11. The hair-removing device 1 may be provided, for example, with an acoustic source which is triggered by the control unit 17 and which produces an acoustic signal the moment the treatment of the portion of the skin 11 present below the opening 33 has been completed. The hair-removing device 1 may alternatively be provided, for example, with electrical drive means controlled by the control unit 17 for the automatic displacement of the hair-removing device 1 over the skin 11 to be treated, instead of with such an acoustic source.

## MARKED UP VERSION OF ABSTRACT

A hair-removing device (1) [comprises] includes a laser source (3), an adjustable laser beam manipulator (5) for positioning a laser beam (7) of the laser source (3) in a target position (9) on a skin (11) to be treated, and an image sensor (47) for detecting an image (49) of the skin. [According to the invention, the] The hair-removing device further comprises a control unit (17) which determines a position and orientation on the skin of a hair (13) to be removed, and which determines the target position of the laser beam as a function of said position and orientation of the hair. The control unit brings the laser beam manipulator in a state corresponding to the target position of the laser beam, and activates the laser source when the laser beam manipulator has reached said state. Thus, the hair-removing device is suitable for use by inexperienced users, and is particularly suitable for the consumer market. [

] In a particular embodiment, the control unit determines the target position of the laser beam in a position (71) on the skin under which a root (15) of the hair is present, so that the root of the hair is destroyed and the hair-removing device (1) is an epilating device by means of which the hair is removed for a relatively long time or even permanently. In another embodiment, the control unit determines the target [postion] position of the laser beam in a position (65) on the hair where the hair comes out of the skin, so that the hair is burnt through near the skin surface and the hair-removing device (1") is a shaving device by means of which a high skin smoothness is obtained.

[Fig. 1]



## MARKED UP VERSION OF CLAIMS

1. (twice amended)     A hair-removing device [provided with] comprising  
a laser source,  
an adjustable laser beam manipulator for positioning a laser beam supplied by the laser  
source during operation in a target position on a skin to be treated, and  
an image sensor for detecting an image of at least a portion of the skin,  
wherein the laser source is controllable by means of an electrical control unit,  
which control unit during operation determines the target position of the laser beam as a  
function of a position and/or orientation on the skin of a hair to be removed as determined  
from the image by the control unit, and  
which control unit activates the laser source the moment the laser beam manipulator is in a  
position which corresponds to the target position of the laser beam.